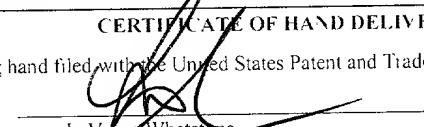
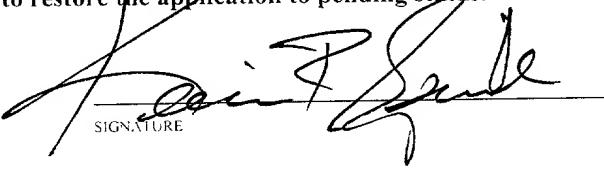


U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE (REV 11-2000)		ATTORNEY'S DOCKET NUMBER 449122003700
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. § 371		U S APPLICATION NO. (If known, see 37 CFR 1.5) 09/806034 <small>Not yet assigned</small>
INTERNATIONAL APPLICATION NO PCT/DE99/03045	INTERNATIONAL FILING DATE 23 September 1999	PRIORITY DATE CLAIMED 25 September 1998
TITLE OF INVENTION IN-HOUSE SUBSYSTEM IN A MOBILE RADIO TELEPHONE NETWORK		
APPLICANT(S) FOR DO/EO/US Edgar BOLINTH et al.		
<p>Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information</p> <p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371</p> <p>3. <input type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below</p> <p>4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (PCT Article 31)</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input checked="" type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau)</p> <p>b. <input checked="" type="checkbox"/> has been communicated by the International Bureau</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US)</p> <p><input checked="" type="checkbox"/> An English language translation of the International Application under PCT Article 19 (35 U.S.C. 371(c)(2))</p> <p>a. <input checked="" type="checkbox"/> is attached hereto</p> <p>b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4)</p> <p><input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input checked="" type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau)</p> <p>b. <input checked="" type="checkbox"/> have been communicated by the International Bureau</p> <p>c. <input type="checkbox"/> have not been made, however, the time limit for making such amendments has NOT expired</p> <p>d. <input type="checkbox"/> have not been made and will not be made</p> <p><input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p><input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4))</p> <p>10. <input checked="" type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5))</p> <p>Items 11. to 16. below concern document(s) or information included:</p> <p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included</p> <p>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment</p> <p>14. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment</p> <p>15. <input type="checkbox"/> A substitute specification</p> <p>16. <input type="checkbox"/> A change of power of attorney and/or address letter</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter 2 and 35 U.S.C. 1.821 - 1.825</p> <p>18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4)</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4)</p> <p>20. <input checked="" type="checkbox"/> Other items or information 1. IPER 2. International Search Report 3. Application Data Sheet 4. Return receipt postcard</p>		
CERTIFICATE OF HAND DELIVERY		
<p>I hereby certify that this correspondence is being hand filed with the United States Patent and Trademark Office in Washington, D.C. on March 26, 2001</p> <p> LaVerne Whetstone</p>		

U.S. APPLICATION NO (if known see 37 CFR 1.5) Not yet Assigned 09/806034	INTERNATIONAL APPLICATION NO PCT/DE99 03045	ATTORNEY DOCKET NUMBER 449122003700																									
21. <input checked="" type="checkbox"/> The following fees are submitted:		CALCULATIONS PTO USE ONLY																									
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): <p>Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO.....\$1,000.00</p> <p>International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO.....\$860.00</p> <p>International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO.....\$710.00</p> <p>International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provision of PCT Article 33(1)-(4)\$690.00</p> <p>International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4)\$100.00</p>																											
ENTER APPROPRIATE BASIC FEE AMOUNT = \$860.00																											
<p>Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e))</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>CLAIMS</th> <th>NUMBER FILED</th> <th>NUMBER EXTRA</th> <th>RATE</th> <th></th> </tr> </thead> <tbody> <tr> <td>Total claims</td> <td>28 - 20 =</td> <td>8</td> <td>x \$18.00</td> <td>\$144.00</td> </tr> <tr> <td>Independent claims</td> <td>2 - 3 =</td> <td>0</td> <td>x \$80.00</td> <td>\$0</td> </tr> <tr> <td colspan="3">MULTIPLE DEPENDENT CLAIM(S) (if applicable)</td> <td>+ \$270.00</td> <td>\$0</td> </tr> <tr> <td colspan="4">TOTAL OF ABOVE CALCULATIONS =</td> <td>\$1004.00</td> </tr> </tbody> </table>			CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		Total claims	28 - 20 =	8	x \$18.00	\$144.00	Independent claims	2 - 3 =	0	x \$80.00	\$0	MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$270.00	\$0	TOTAL OF ABOVE CALCULATIONS =				\$1004.00
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<p>Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).</p> <p>TOTAL NATIONAL FEE = \$1004.00</p>																											
<p>Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) \$40.00 per property</p> <p>TOTAL FEES ENCLOSED = \$1004.00</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: center;">Amount to be refunded:</td> <td style="text-align: right;">\$</td> </tr> <tr> <td></td> <td></td> <td style="text-align: right;">charged: \$</td> </tr> </table>				Amount to be refunded:	\$			charged: \$																			
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<p>a. <input checked="" type="checkbox"/> A check in the amount of \$ 1,004.00 to cover the above fees is enclosed.</p> <p>b. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment to <u>Deposit Account No. 03-1952</u>.</p>																											
<p>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</p>																											
<p>SEND ALL CORRESPONDENCE TO:</p> <p>Kevin R. Spivak Morrison & Foerster LLP 2000 Pennsylvania Avenue, N.W. Washington, D.C. 20006-1888</p>																											
 <p>SIGNATURE</p> <p>Kevin R. Spivak Registration No 43,148</p>																											

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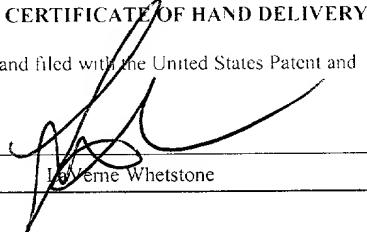
PATENT

Docket No. 449122003700

JCOS Rec'd PCT/PTO 26 MAR 2001

CERTIFICATE OF HAND DELIVERY

I hereby certify that this correspondence is being hand filed with the United States Patent and Trademark Office in Washington, D C on March 26, 2001


Lawrence Whetstone

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Edgr BOLINTH et al.

Serial No.: Not yet Assigned

Filing Date: March 26, 2001

For: IN-HOUSE SUBSYSTEM IN A
MOBILE RADIO TELEPHONE
NETWORK

Examiner: Not yet Assigned

Group Art Unit: Not yet Assigned

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to the examination on the merits, please amend this application as follows:

In the Specification:

On page 1 before the first paragraph, please insert the following new paragraph:

--This application claims priority to International Application No. PCT/DE99/03045

which was published in the German language on September 23, 1999.--

On page 1, between lines 4 and 5 please insert the heading: TECHNICAL FIELD OF THE INVENTION.

Please replace the paragraph beginning on line 5 of page 1, with the following rewritten paragraph:

--The invention relates to an in-house subsystem in a mobile radio network and/or a wired communication network, and in particular to, an in house subsystem in a mobile radio network having a fixed home base station, at least one repeater station (repeater) and at least one mobile station.--

On page 1, between lines 11 and 12 please insert the heading:

BACKGROUND OF THE INVENTION.

Please replace the paragraph beginning on line 12 page 1, with the following rewritten paragraph:

--A subsystem and a method are known from international patent application WO 94/19877. This application shows a subsystem in a mobile radio network which has a fixed base station, a repeater station and a plurality of mobile stations, the fixed base station being connected to an external telecommunication network and being connected to a mobile station by means of a transmission/reception antenna. Accordingly, this document also discloses a method for communication in a subsystem of a mobile radio network or of a wired communication network, where, in the subsystem, comprising a plurality of elements, the base station maintains a connection to a mobile radio network and possibly to a landline network and forwards this connection to the at least one mobile station.--

Please replace the paragraph beginning on line 1 of page 2 with the following rewritten paragraph:

--Reference is also made to the applicant's patent application DE 198 20 760 A1, which solves the problem of adequate coverage. This document shows a broadband communication system having a plurality of wireless communication appliances connected to the telephone network via repeater stations, where the repeater stations are connected to the power supply network and communicate with one another via the latter.--

Please insert on page 2, before line 25 the following paragraphs:

--WO 94/03993 discloses an in-house branch exchange in which a multiplicity of wireless base stations are connected, this "wireless" in-house branch exchange using a frequency scanner to carry out for identification and selection of frequencies.

SUMMARY OF THE INVENTION.

In one embodiment of the invention an in-house subsystem in at least one of a mobile radio network and a wired communication network, a fixed home base station, at least one repeater station, at least one mobile station and at least one transmission/reception antenna for connection either to the at least one mobile station or to the at least one repeater station. The fixed home base station having at least one connection means to an external telecommunication network and at least one transmission/reception antenna for internal connection to the at least one repeater station. The at least one repeater station having at least one connection element for connection either to one of the home base station or to another repeater station and the at least one mobile station having one of the transmission/reception antennas for communication with at least one of the mobile radio network or with a repeater station, wherein the elements of the subsystem have means which automatically organize the splitting of system resources between the fixed home base station, the at least one repeater station and the at least one mobile station.

In one aspect of the invention the subsystem wherein the means for automatic organization at least comprise an algorithm for automatically splitting the system resources between intermediate connections present in the fixed home base station, the at least one repeater stations and the at least one mobile station, each element of the subsystem automatically using the system resources on the basis of the same algorithm.

In another aspect of the invention the subsystem, wherein the connection means in the fixed home base station is a transmission/reception unit for wireless communication with at least one of the mobile radio network or the wired connection to a landline telecommunication network.

In still another aspect of the invention the subsystem, wherein one connection element in the repeater station is at least one of the transmission/reception antenna a cable connection.

In yet another aspect of the invention wherein, in the case of at least one line of connection, the communication from the fixed home base station to the mobile station is routed via at least one repeater station.

In another aspect of the invention the subsystem, wherein the system resources split among one another include at least different frequencies.

In still another aspect of the invention wherein the system resources split among one another include at least different timeslots.

In yet another aspect of the invention the subsystem wherein the system resources split among one another include at least different Code Division Multiple Access codes.

In another aspect of the invention the subsystem wherein each mobile station, each repeater station and the fixed home base station have a respective personal identification number and the repeater stations and/or the fixed home base station has a means for distinguishing between mobile stations with access authorization and mobile stations without access authorization.

In still another aspect of the invention the subsystem wherein the means for distinguishing between mobile stations with access authorization and mobile stations without

access authorization has a data memory which includes the personal identification number of mobile stations with access authorization.

In yet another aspect of the invention the subsystem wherein the subsystem is connected to the mobile radio network on the basis of a Frequency Division Duplex method and the connection in the subsystem is based on a Time Frequency Division Duplex method.

In another aspect of the invention the subsystem as claimed in claim 1, wherein, in the case of one repeater station, said repeater station has means for implementing transfer and/or acceptance of the mobile station to/by the fixed home base station.

In yet another aspect of the invention the subsystem wherein in the case of at least two repeater stations, said repeater stations have means for implementing connection transfer for the mobile station among the repeater stations.

In still another aspect of the invention the subsystem wherein at least one repeater station has means for implementing connection transfer and connection acceptance for the mobile station between the mobile radio network and the repeater stations.

In another aspect of the invention the subsystem wherein the subsystem is associated with a Global System for Mobile Communications network.

In still another aspect of the invention the subsystem wherein the subsystem is associated with a Universal Mobile Telecommunications System network.

In yet another aspect of the invention the subsystem wherein the subsystem's landline network connection is associated with a Integrated Services Digital Subscriber Line network.

In another aspect of the invention the subsystem wherein the subsystem's landline network connection is associated with a Public Switched Telephone Network.

In still another aspect of the invention the subsystem wherein the subsystem's landline network connection is associated with a power supply network/powerline network.

In yet another aspect of the invention the subsystem wherein the subsystem's landline network connection is associated with a Digital Subscriber Line/Asymmetric Digital Subscriber Line network.

In another embodiment of the invention a method for communication in a subsystem of at least one of a mobile network and a wired communication network, the subsystem comprising: a home base station; at least one repeater station; and at least one mobile station where the home base station maintains a connection to at least one of a mobile radio network and a landline network, and forwards the connection to the at least one mobile station using the at least one repeater station, wherein one repeater station automatically splits the resources.

In one aspect of the invention the method wherein the resource splitting includes splitting used frequencies and/or used timeslot and/or Code Division Multiple Access code.

In still another aspect of the invention the method wherein the mobile station or home base station which initiates the logical connection setup starts the automatic use of the resources between itself and the next connection element in the logical connection chain, and, if there are one or more repeater stations in the logical line of connection, the respective repeater station performs channel setup for the next element, including automatic resource use.

In yet another aspect of the invention the method wherein a repeater station serves a plurality of mobile stations at the same time.

In another aspect of the invention the method wherein the repeater station transmits on a Broadcast Control Channel a list of resources already used which cannot be used by the mobile station initiating a connection.

In yet another aspect of the invention the method wherein the connection setup is initiated from the landline network and/or mobile radio network incoming call.

In still another aspect of the invention the method wherein it is carried out for the connection setup is initiated by the subsystem outgoing call.

In another aspect of the invention the method wherein the subsystem performs the connection transfer procedures between various repeater stations and/or between a repeater station and the home base station.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates an exemplary subsystem of the invention for a building complex.

Figure 2 illustrates an exemplary subsystem of the invention with a different repeater split.

DETAILED DESCRIPTION OF THE INVENTION--

Please replace the paragraph beginning on line 25 of page 2 with the following rewritten paragraph:

--The invention describes an in-house subsystem in a mobile radio network and/or in a wired communication network and a method for communication in a subsystem of a mobile radio network and/or of a wired communication network which provides satisfactory transmission/reception coverage for the mobile stations even in relatively large buildings and building complexes, including in the associated open-air installations.--

Please replace the paragraph beginning on line 1 of page 3 with the following rewritten paragraph:

--The inventors discloses an in-house subsystem in a mobile radio network and/or in a wired communication network which comprises, for example, a fixed home base station, at least one repeater station (repeater) and at least one mobile station, the fixed home base station having at least one connection means to an external telecommunication network and at least one transmission/reception antenna for internal connection to the at least one repeater station, the at least one repeater station having at least one connection element for connection either to the home base station or to another repeater station, and at least one transmission/reception antenna for connection either to the at least one mobile station or to another repeater station, and the at least one mobile station having a transmission/reception antenna for communication with the mobile radio network or with a repeater station, the elements of the subsystem having means which automatically organize the splitting of the system resources between the home base

station, the at least one repeater station and the at least one mobile station. The way in which automatic organization works is explained in more detail further below.--

Please replace the paragraph beginning on line 24 of page 3 with the following rewritten paragraph:

--The term “in-house” in the context of the subsystem is used in the sense of the term “residential”, as used generally in specialist circles, and is used to distinguish from “public” systems.--

Please replace the paragraph beginning on line 29 of page 3 with the following rewritten paragraph:

--In the subsystem according to the invention, the means for automatic organization may at least comprise an algorithm for automatically splitting the system resources between intermediate connections present in the home base stations, the at least one repeater stations and the at least one mobile station, each element of the subsystem automatically using the system resources on the basis of the same algorithm.--

Please replace the paragraph beginning on line 1 of page 4 with the following rewritten paragraph:

--In one embodiment, the connection means in the home base station are/is a transmission/reception unit for wireless communication with a mobile radio network and/or are/is a wired connection to a landline telecommunication network.--

Please replace the paragraph beginning on line 6 of page 4 with the following rewritten paragraph:

--In another embodiment, of the subsystem, in the case of at least one line of connection, the communication from the home base station to a mobile station is routed via at least one repeater station or via a plurality of repeater stations communicating with one another.--

Please replace the paragraph beginning on line 17 of page 4 with the following rewritten paragraph:

--Each mobile station, each repeater station and the home base station have a respective PIN (PIN = Personal Identification Number), and the repeater stations and/or the home base station have a means for distinguishing between mobile stations with access authorization and mobile stations without access authorization. Advantageously, the means for distinguishing between mobile stations with access authorization and mobile stations without access authorization can also have a data memory which contains the PIN of mobile stations with access authorization.--

Please replace the paragraph beginning on line 36 of page 4 with the following rewritten paragraph:

--The at least one repeater station may have means for implementing transfer and/or acceptance of the mobile station (handover) to/by the home base station and/or to/by another repeater station. This allows a mobile station to move freely within the coverage area of the subsystem while the connection of the mobile station is routed via different connection paths and repeater stations, according to location, or is changed over between different repeater stations and connection paths.--

Please replace the paragraph beginning on line 9 of page 5 with the following rewritten paragraph:

--The at least one repeater station may alternatively have means for implementing connection transfer and connection acceptance for the mobile station (handover) between the mobile radio network and the repeater stations. This achieves further improved mobility for the mobile stations, since unproblematical transfer between an internal connection in the subsystem to the external connection in the mobile radio network is now also possible, without the user's communication being disrupted by this process.--

Please replace the paragraph beginning on line 20 of page 5 with the following rewritten paragraph:

--The subsystem described above can, by way of example, be associated with the GSM network (GSM = Global System for Mobile Communications) and/or with the UMTS network (UMTS = Universal Mobile Telecommunication System). Similarly, the subsystem's landline network connection can be associated with the ISDN network (ISDN = Integrated Services Digital Network), with the PSTN network (PSTN = Public Switched Telephone Network), with the power supply network/powerline network and/or with the xDSL/ADSL network (xDSL = general generic term for Digital Subscriber Line, ADSL = Asymmetric Digital Subscriber Line). One having ordinary skill will recognize that the invention is not limited to these embodiments.--

Please replace the paragraph beginning on line 33 of page 5 with the following rewritten paragraph:

--The invention which is set above by means of a method for communication in a subsystem of a mobile radio network and/or of a wired communication network, where, in the subsystem, which comprises a plurality of elements including a fixed home base station, at least one repeater station and at least one mobile station, the home base station maintains a connection

to a mobile radio network and possibly to a landline network and forwards this connection to the at least one mobile station using the at least one repeater station, and the at least one repeater station automatically splits the resources. This automatic splitting of resources represents automatic organization of the system, the operation of which will be explained in more detail below.--

Please replace the paragraph beginning on line 14 of page 6 with the following rewritten paragraph:

--In the preferred embodiment, it is preferable that the element (i.e., mobile station or base station) which initiates the logical connection setup starts the automatic use of the resources (i.e., setup/clear-down of the data channels) between itself and the next connection element in the logical connection chain. If there are one or more repeater stations in the logical line of connection, the respective repeater station performs channel setup for the next element, including automatic resource use.--

Please replace the paragraph beginning on line 24 of page 6 with the following rewritten paragraph:

--In another embodiment, a repeater station can serve a plurality of mobile stations at the same time. This may be done, for example, by virtue of the repeater station(s) operating at a plurality of frequencies at the same time, or each mobile station being assigned one or more timeslots in successive time frames.--

Please replace the paragraph beginning on line 31 of page 6 with the following rewritten paragraph:

--One option for splitting the available system resources can involve the repeater station transmitting on a particular, predefined resource (frequency, code, timeslot), e.g. on a BCCH (Broadcast Control Channel), or in a particular free timeslot a list of resources already used. In

this way, a mobile station potentially initiating a connection knows which resources cannot currently be used.--

Please replace the paragraph beginning on line 10 of page 7 with the following rewritten paragraph:

--With similar advantage, the invention also provides the opportunity to use the method described above within the subsystem for hand over procedures between the various repeater stations and/or between a repeater station and the base station.--

Please replace the paragraph beginning on line 15 of page 7 with the following rewritten paragraph:

--The automatic organization in terms of resource splitting denotes a search algorithm which is implemented by the base station, the repeater station and/or the mobile station and assesses the free system resources - which usually comprise frequency, code and timeslot indices - using a quality criterion (e.g. RSSI = Radio Signal Strength Indication = measurement of reception field strength, checking of CRC bits), to determine the extent to which the resources are disrupted or used, and uses a cyclically refreshed look-up table (for frequency, code and timeslot index) to decide which resource is used for data transmission.--

Please replace the paragraph beginning on line 5 of page 8 with the following rewritten paragraph:

--In large volumes of traffic, the repeater station can use the BCCH to inform the mobile stations of which resources are already used or which resources cannot be used. This prevents faults (e.g. the simultaneous attempt by two mobile stations to access the same resource).--

Please delete lines 12-16.

Please replace the paragraph beginning on line 17 of page 8 with the following rewritten paragraph:

--One having ordinary skill will appreciate that the invention mentioned above, and to be explained below, can be used not only in the particular combination indicated, but also in other combinations or on their own--

On page 8, please delete lines 26-29.

Please replace the paragraph beginning on line 31 of page 8 with the following rewritten paragraph:

--Figure 1 is a schematic illustration of an inventive subsystem with its elements in a building complex having four building parts A-D. The building part A includes a home base station 3 connected to a mobile radio network 1 via an external transmission/reception antenna 4. The mobile radio network may be, by way of example, a GSM network, UMTS network or other mobile radio network. In addition, the base station is connected by means of a wire line 22 to a landline network, e.g. to the ISDN network, PTSN network or another hardwired communication network 2. For internal communication, the home base station 3 has a transmission/reception antenna 5 which it can use to connect to the other mobile stations 17 and repeater stations 7 and 8 in the building part A.--

Please replace the paragraph beginning on line 13 of page 9 with the following rewritten paragraph:

--The repeater station 8 has a transmission/ reception antenna 12 and 13 situated in the building part A and in the building part B. The building part B also includes a transmission/reception antenna 14 for the repeater station 9 from the building part D. The repeater station 9 also has a transmission/reception antenna 15 for the building part D.--

Please replace the paragraph beginning on line 36 of page 9 with the following rewritten paragraph:

--In addition, each of the building parts can include one or more mobile station(s) represented symbolically and provided with the reference numerals 17-20. The radio connections between the individual elements of the subsystem are symbolized by the arrows 23-29.--

Please replace the paragraph beginning on line 28 of page 11 with the following rewritten paragraph:

--Another variation of the subsystem according to the invention is shown in Figure 2. The fundamental difference with respect to Figure 1 is that the repeater station 8 is not in the building part A, but rather is installed in the building part B. In addition, the building part D has no repeater stations.--

In the Claims:

1. (Amended) An in-house subsystem in at least one of a mobile radio network and a wired communication network, comprising:

 a fixed home base station;

 at least one repeater station;

 at least one mobile station; and

 at least one transmission/reception antenna for connection either to the at least one mobile station or to the at least one repeater station,

 the fixed home base station having at least one connection means to an external telecommunication network and at least one transmission/reception antenna for internal connection to the at least one repeater station,

 the at least one repeater station having at least one connection element for connection either to one of the home base station or to another repeater station,

and

the at least one mobile station having one of the transmission/reception antennas for communication with at least one of the mobile radio network or with a repeater station, wherein the elements of the subsystem have means which automatically organize the splitting of system resources between the fixed home base station, the at least one repeater station and the at least one mobile station.

2. (Amended) The subsystem as claimed in claim 1, wherein the means for automatic organization at least comprise an algorithm for automatically splitting the system resources between intermediate connections present in the fixed home base station, the at least one repeater stations and the at least one mobile station, each element of the subsystem automatically using the system resources on the basis of the same algorithm.

3. (Amended) The subsystem as claimed in claim 1, wherein the connection means in the fixed home base station is a transmission/reception unit for wireless communication with at least one of the mobile radio network or the wired connection to a landline telecommunication network.

4. (Amended) The subsystem as claimed in claim 1, wherein one connection element in the repeater station is at least one of the transmission/reception antenna a cable connection.

5. (Amended) The subsystem as claimed in claim 1, wherein, in the case of at least one line of connection, the communication from the fixed home base station to the mobile station is routed via at least one repeater station.

6. (Amended) The subsystem as claimed in claim 1, wherein the system resources split among one another include at least different frequencies.

7. (Amended) The subsystem as claimed in claim 1, wherein the system resources split among one another include at least different timeslots.

8. (Amended) The subsystem as claimed in claim 1, wherein the system resources split among one another include at least different Code Division Multiple Access codes.

9. (Amended) The subsystem as claimed in claim 1, wherein each mobile station, each repeater station and the fixed home base station have a respective personal identification number and the repeater stations and/or the fixed home base station has a means for distinguishing between mobile stations with access authorization and mobile stations without access authorization.

10. (Amended) The subsystem as claimed in claim 9, wherein the means for distinguishing between mobile stations with access authorization and mobile stations without access authorization has a data memory which includes the personal identification number of mobile stations with access authorization.

11. (Amended) The subsystem as claimed in claim 1, wherein the subsystem is connected to the mobile radio network on the basis of a Frequency Division Duplex method and the connection in the subsystem is based on a Time Frequency Division Duplex method.

12. (Amended) The subsystem as claimed in claim 1, wherein, in the case of one repeater station, said repeater station has means for implementing transfer and/or acceptance of the mobile station to/by the fixed home base station.

13. (Amended) The subsystem as claimed in claim 1, wherein in the case of at least two repeater stations, said repeater stations have means for implementing connection transfer for the mobile station among the repeater stations.

14. (Amended) The subsystem as claimed in claim 1, wherein at least one repeater station has means for implementing connection transfer and connection acceptance for the mobile station between the mobile radio network and the repeater stations.

15. (Amended) The subsystem as claimed in claim 1, wherein the subsystem is associated with a Global System for Mobile Communications network.

16. (Amended) The subsystem as claimed in claim 1, wherein the subsystem is associated with a Universal Mobile Telecommunications System network.

17. (Amended) The subsystem as claimed in claim 1, wherein the subsystem's landline network connection is associated with a Integrated Services Digital Subscriber Line network.

18. (Amended) The subsystem as claimed in claim 1, wherein the subsystem's landline network connection is associated with a Public Switched Telephone Network.

19. (Amended) The subsystem as claimed in claim 1, wherein the subsystem's landline network connection is associated with a power supply network/powerline network.

20. (Amended) The subsystem as claimed in claim 1, wherein the subsystem's landline network connection is associated with a Digital Subscriber Line/Asymmetric Digital Subscriber Line network.

21. (Amended) A method for communication in a subsystem of at least one of a mobile network and a wired communication network, the subsystem comprising: a home base station; at least one repeater station; and at least one mobile station,

where the home base station maintains a connection to at least one of a mobile radio network and a landline network, and forwards the connection to the at least one mobile station using the at least one repeater station, wherein one repeater station automatically splits the resources.

22. (Amended) The method as claimed in claim 21, wherein the resource splitting includes splitting used frequencies and/or used timeslot and/or Code Division Multiple Access code.

23. (Amended) The method as claimed in claim 21, wherein the mobile station or home base station which initiates the logical connection setup starts the automatic use of the resources between itself and the next connection element in the logical connection chain, and, if there are one or more repeater stations in the logical line of connection, the respective repeater station performs channel setup for the next element, including automatic resource use.

24. (Amended) The method as claimed in claim 21, wherein a repeater station serves a plurality of mobile stations at the same time.

25. (Amended) The method as claimed in claim 21, wherein the repeater station transmits on a Broadcast Control Channel a list of resources already used which cannot be used by the mobile station initiating a connection.

26. (Amended) The method as claimed in claim 21, wherein the connection setup is initiated from the landline network and/or mobile radio network incoming call.

27. (Amended) The method as claimed in claim 21, wherein it is carried out for the connection setup is initiated by the subsystem outgoing call.

28. (Amended) The method as claimed in claim 21, wherein the subsystem performs the connection transfer procedures between various repeater stations and/or between a repeater station and the home base station.

In the Abstract:

Please replace the Abstract in its entirety with the Abstract attached hereto.

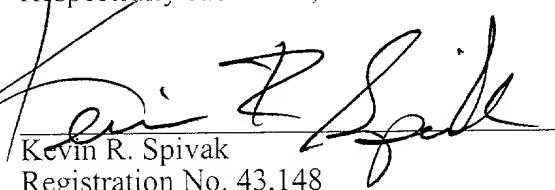
REMARKS

The above amendments to the specification, claims and abstract have been made to place the application in proper U.S. format and to conform with proper grammatical and idiomatic English. None of the amendments herein are made for reasons related to patentability. No new matter has been added.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**".

In the unlikely event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. 449122003700. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Dated: March 26, 2001

Respectfully submitted,
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

For the convenience of the Examiner, the changes made are shown below with deleted text in strikethrough and added text in underline.

In the Specification:

Page 1 before the first paragraph, has been amended to include the following insert:

This application claims priority to International Application No. PCT/DE99/03045 which was published in the German language on September 23, 1999.

Page 1, between lines 4 and 5 has been amended to insert the following heading:

TECHNICAL FIELD OF THE INVENTION.

Paragraph beginning on line 5 of page 1 has been amended as follows:

The invention relates to an in-house subsystem in a mobile radio network and/or a wired communication network, and in particular to, an in house subsystem in a mobile radio network having comprising a fixed home base station, at least one repeater station (repeater) and at least one mobile station. The invention also relates to a method for communication in a subsystem of a mobile radio network and/or of a wired communication network.

Page 1, between lines 11 and 12 has been amended to insert the following heading:

BACKGROUND OF THE INVENTION.

Paragraph beginning on line 12 page 1 has been amended as follows:

A ~~similar~~ subsystem and a ~~similar~~ method are known from international patent application WO 94/19877. This application shows a subsystem in a mobile radio network which has a fixed base station, a repeater station and a plurality of mobile stations, the fixed base station being connected to an external telecommunication network and being connected to a

mobile station by means of a transmission/reception antenna. Accordingly, this document also discloses a method for communication in a subsystem of a mobile radio network or of a wired communication network, where, in the subsystem, comprising a plurality of elements, the base station maintains a connection to a mobile radio network and possibly to a landline network and forwards this connection to the at least one mobile station.

Paragraph beginning on line 1 of page 2 has been amended as follows:

Reference is also made to the applicant's patent application DE 198 20 760 A1, published after the priority date, which solves the problem of adequate coverage. This document shows a broadband communication system having a plurality of wireless communication appliances connected to the telephone network via repeater stations, where the repeater stations are connected to the power supply network and communicate with one another via the latter.

Page 2, before line 25 has been amended to include the following paragraph:

WO 94/03993 discloses an in-house branch exchange in which a multiplicity of wireless base stations are connected, this "wireless" in-house branch exchange using a frequency scanner to carry out for identification and selection of frequencies.

SUMMARY OF THE INVENTION.

In one embodiment of the invention an in-house subsystem in at least one of a mobile radio network and a wired communication network, a fixed home base station, at least one repeater station, at least one mobile station and at least one transmission/reception antenna for connection either to the at least one mobile station or to the at least one repeater station. The fixed home base station having at least one connection means to an external telecommunication network and at least one transmission/reception antenna for internal connection to the at least one repeater station. The at least one repeater station having at least one connection element for connection either to one of the home base station or to another repeater station and the at least

one mobile station having one of the transmission/reception antennas for communication with at least one of the mobile radio network or with a repeater station, wherein the elements of the subsystem have means which automatically organize the splitting of system resources between the fixed home base station, the at least one repeater station and the at least one mobile station.

In one aspect of the invention the subsystem wherein the means for automatic organization at least comprise an algorithm for automatically splitting the system resources between intermediate connections present in the fixed home base station, the at least one repeater stations and the at least one mobile station, each element of the subsystem automatically using the system resources on the basis of the same algorithm.

In another aspect of the invention the subsystem, wherein the connection means in the fixed home base station is a transmission/reception unit for wireless communication with at least one of the mobile radio network or the wired connection to a landline telecommunication network.

In still another aspect of the invention the subsystem, wherein one connection element in the repeater station is at least one of the transmission/reception antenna a cable connection.

In yet another aspect of the invention wherein, in the case of at least one line of connection, the communication from the fixed home base station to the mobile station is routed via at least one repeater station.

In another aspect of the invention the subsystem, wherein the system resources split among one another include at least different frequencies.

In still another aspect of the invention wherein the system resources split among one another include at least different timeslots.

In yet another aspect of the invention the subsystem wherein the system resources split among one another include at least different Code Division Multiple Access codes.

In another aspect of the invention the subsystem wherein each mobile station, each repeater station and the fixed home base station have a respective personal identification number and the repeater stations and/or the fixed home base station has a means for distinguishing

between mobile stations with access authorization and mobile stations without access authorization.

In still another aspect of the invention the subsystem wherein the means for distinguishing between mobile stations with access authorization and mobile stations without access authorization has a data memory which includes the personal identification number of mobile stations with access authorization.

In yet another aspect of the invention the subsystem wherein the subsystem is connected to the mobile radio network on the basis of a Frequency Division Duplex method and the connection in the subsystem is based on a Time Frequency Division Duplex method.

In another aspect of the invention the subsystem as claimed in claim 1, wherein, in the case of one repeater station, said repeater station has means for implementing transfer and/or acceptance of the mobile station to/by the fixed home base station.

In yet another aspect of the invention the subsystem wherein in the case of at least two repeater stations, said repeater stations have means for implementing connection transfer for the mobile station among the repeater stations.

In still another aspect of the invention the subsystem wherein at least one repeater station has means for implementing connection transfer and connection acceptance for the mobile station between the mobile radio network and the repeater stations.

In another aspect of the invention the subsystem wherein the subsystem is associated with a Global System for Mobile Communications network.

In still another aspect of the invention the subsystem wherein the subsystem is associated with a Universal Mobile Telecommunications System network.

In yet another aspect of the invention the subsystem wherein the subsystem's landline network connection is associated with a Integrated Services Digital Subscriber Line network.

In another aspect of the invention the subsystem wherein the subsystem's landline network connection is associated with a Public Switched Telephone Network.

In still another aspect of the invention the subsystem wherein the subsystem's landline network connection is associated with a power supply network/powerline network.

In yet another aspect of the invention the subsystem wherein the subsystem's landline network connection is associated with a Digital Subscriber Line/Asymmetric Digital Subscriber Line network.

In another embodiment of the invention a method for communication in a subsystem of at least one of a mobile network and a wired communication network, the subsystem comprising: a home base station; at least one repeater station; and at least one mobile station where the home base station maintains a connection to at least one of a mobile radio network and a landline network, and forwards the connection to the at least one mobile station using the at least one repeater station, wherein one repeater station automatically splits the resources.

In one aspect of the invention the method wherein the resource splitting includes splitting used frequencies and/or used timeslot and/or Code Division Multiple Access code.

In still another aspect of the invention the method wherein the mobile station or home base station which initiates the logical connection setup starts the automatic use of the resources between itself and the next connection element in the logical connection chain, and, if there are one or more repeater stations in the logical line of connection, the respective repeater station performs channel setup for the next element, including automatic resource use.

In yet another aspect of the invention the method wherein a repeater station serves a plurality of mobile stations at the same time.

In another aspect of the invention the method wherein the repeater station transmits on a Broadcast Control Channel a list of resources already used which cannot be used by the mobile station initiating a connection.

In yet another aspect of the invention the method wherein the connection setup is initiated from the landline network and/or mobile radio network incoming call.

In still another aspect of the invention the method wherein it is carried out for the connection setup is initiated by the subsystem outgoing call.

In another aspect of the invention the method wherein the subsystem performs the connection transfer procedures between various repeater stations and/or between a repeater station and the home base station.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates an exemplary subsystem of the invention for a building complex.

Figure 2 illustrates an exemplary subsystem of the invention with a different repeater split.

DETAILED DESCRIPTION OF THE INVENTION

Paragraph beginning on line 25 of page 2 has been amended as follows:

~~It is therefore an object of the~~ The invention ~~to describe~~ describes an in-house subsystem in a mobile radio network and/or in a wired communication network and a method for communication in a subsystem of a mobile radio network and/or of a wired communication network which provides satisfactory transmission/reception coverage for the mobile stations even in relatively large buildings and building complexes, including in the associated open-air installations.

Paragraph beginning on line 1 of page 3 has been amended as follows:

~~Accordingly, the~~ The inventors ~~propose~~ discloses an in-house subsystem in a mobile radio network and/or in a wired communication network which comprises, for example, a fixed home base station, at least one repeater station (repeater) and at least one mobile station, the fixed home base station having at least one connection means to an external telecommunication network and at least one transmission/reception antenna for internal connection to the at least one repeater station, the at least one repeater station having at least one connection element for connection either to the home base station or to another repeater station, and at least one

transmission/reception antenna for connection either to the at least one mobile station or to another repeater station, and the at least one mobile station having a transmission/reception antenna for communication with the mobile radio network or with a repeater station, all the elements of the subsystem having means which automatically organize the splitting of the system resources between the home base station, the at least one repeater station and the at least one mobile station. The way in which automatic organization works is explained in more detail further below.

Paragraph beginning on line 24 of page 3 has been amended as follows:

~~It should be pointed out that, in this document, the~~ The term “in-house” in the context of the subsystem is used in the sense of the term “residential”, as used generally in specialist circles. and is used to distinguish from “public” systems.

Paragraph beginning on line 29 of page 3 has been amended as follows:

~~One particular refinement of~~ In the subsystem according to the invention, ~~proposes that~~ the means for automatic organization may at least comprise an algorithm for automatically splitting the system resources between intermediate connections present lacuna in the home base stations, the at least one repeater stations and the at least one mobile station, each element of the subsystem automatically using the system resources on the basis of the same algorithm.

Paragraph beginning on line 1 of page 4 has been amended as follows:

~~In another advantageous refinement the,~~ In one embodiment, the connection means in the home base station are/is a transmission/reception unit for wireless communication with a mobile radio network and/or are/is a wired connection to a landline telecommunication network.

Paragraph beginning on line 6 of page 4 has been amended as follows:

~~In another embodiment, accordance with another advantageous refinement of the subsystem, in the case of at least one line of connection, the communication from the home base station to a mobile station is routed via at least one repeater station or via a plurality of repeater stations communicating with one another.~~

Paragraph beginning on line 17 of page 4 has been amended as follows:

~~Another requirement within the scope of the invention is that each~~ Each mobile station, each repeater station and the home base station have a respective PIN (PIN = Personal Identification Number), and the repeater stations and/or the home base station have a means for distinguishing between mobile stations with access authorization and mobile stations without access authorization. Advantageously, the means for distinguishing between mobile stations with access authorization and mobile stations without access authorization can also have a data memory which contains the PIN of mobile stations with access authorization.

Paragraph beginning on line 36 of page 4 has been amended as follows:

~~Another advantageous refinement of the subsystem according to the invention is that the~~ The at least one repeater station ~~has~~ may have means for implementing transfer and/or acceptance of the mobile station (handover) to/by the home base station and/or to/by another repeater station. This allows a mobile station to move freely within the coverage area of the subsystem while the connection of the mobile station is routed via different connection paths and repeater stations, according to location, or is changed over between different repeater stations and connection paths.

Paragraph beginning on line 9 of page 5 has been amended as follows:

~~Another, more extensive refinement of the subsystem is that the~~ The at least one repeater station may alternatively have means for implementing connection transfer and connection

acceptance for the mobile station (handover) between the mobile radio network and the repeater stations. This achieves further improved mobility for the mobile stations, since unproblematical transfer between an internal connection in the subsystem to the external connection in the mobile radio network is now also possible, without the user's communication being disrupted by this process.

Paragraph beginning on line 20 of page 5 has been amended as follows:

The subsystem described above can, by way of example, be associated with the GSM network (GSM = Global System for Mobile Communications) and/or with the UMTS network (UMTS = Universal Mobile Telecommunication System). Similarly, the subsystem's landline network connection can be associated with the ISDN network (ISDN = Integrated Services Digital Network), with the PSTN network (PSTN = Public Switched Telephone Network), with the power supply network/powerline network and/or with the xDSL/ADSL network (xDSL = general generic term for Digital Subscriber Line, ADSL = Asymmetric Digital Subscriber Line). One having ordinary skill will recognize that the invention is not limited to these embodiments.

Paragraph beginning on line 33 of page 5 has been amended as follows:

~~The invention also achieves the object~~ The invention which is set above by means of a method for communication in a subsystem of a mobile radio network and/or of a wired communication network, where, in the subsystem, which comprises a plurality of elements ~~containing~~ including a fixed home base station, at least one repeater station and at least one mobile station, the home base station maintains a connection to a mobile radio network and possibly to a landline network and forwards this connection to the at least one mobile station using the at least one repeater station, and the at least one repeater station automatically splits the resources. This automatic splitting of resources represents automatic organization of the system, the operation of which will be explained in more detail below at a later point.

Paragraph beginning on line 14 of page 6 has been amended as follows:

In the preferred embodiment, it is preferable that the Advantageously, with the designated method, only that element (i.e., mobile station or base station) which initiates the logical connection setup starts the automatic use of the resources (i.e., setup/clear-down of the data channels) between itself and the next connection element in the logical connection chain. If there are one or more repeater stations in the logical line of connection, the respective repeater station performs channel setup for the next element, including automatic resource use.

Paragraph beginning on line 24 of page 6 has been amended as follows:

In another embodiment, Another refinement of the method proposes that a repeater station can serve a plurality of mobile stations at the same time. This may be done, for example, by virtue of the repeater station(s) operating at a plurality of frequencies at the same time, or each mobile station being assigned one or more timeslots in successive time frames.

Paragraph beginning on line 31 of page 6 has been amended as follows:

One ~~advantageous~~ option for splitting the available system resources can involve the repeater station transmitting on a particular, predefined resource (frequency, code, timeslot), e.g. on a BCCH (Broadcast Control Channel), or in a particular free timeslot a list of resources already used. In this way, a mobile station potentially initiating a connection knows which resources cannot currently be used.

Paragraph beginning on line 10 of page 7 has been amended as follows:

With similar advantage, the invention also provides the opportunity to use the method described ~~in more detail~~ above within the subsystem for hand over procedures between the various repeater stations and/or between a repeater station and the base station.

Paragraph beginning on line 15 of page 7 has been amended as follows:

The aforementioned concept of automatic organization in terms of resource splitting denotes a search algorithm which is respectively implemented by the base station, the repeater station and/or the mobile station and assesses the respectively free system resources - which usually comprise frequency, code and timeslot indices - using a quality criterion (e.g.

RSSI = Radio Signal Strength Indication = measurement of reception field strength, checking of CRC bits), to determine the extent to which the resources are disrupted or used, and uses a cyclically refreshed look-up table (for frequency, code and timeslot index) to decide which resource is used for data transmission.

Paragraph beginning on line 5 of page 8 has been amended as follows:

~~Another improvement and optimization, which comes to bear particularly with a~~ In large volumes of traffic, ~~can involve~~ the repeater station can use using the BCCH to inform the mobile stations of which resources are already used or which resources cannot be used. This prevents faults (e.g. the simultaneous attempt by two mobile stations to access the same resource).

Paragraph beginning on line 12 of page 8 has been amended as follows:

~~Other refinements, additional features and advantages of the invention can be found in the description below of preferred illustrative embodiments with reference to the drawings, and in the dependent claims.~~

Paragraph beginning on line 17 of page 8 has been amended as follows:

One having ordinary skill will appreciate that It goes without saying that the features of the invention which are mentioned above, and are yet to be explained below, can be used not only in the particular combination indicated, but also in other combinations or on their own., without departing from the scope of the invention.

Paragraph beginning on line 26 of page 8 has been amended as follows:

Figure 1: ~~inventive subsystem for a building complex.~~

Figure 2: ~~further variant of a subsystem with a different repeater split.~~

Paragraph beginning on line 31 of page 8 has been amended as follows:

Figure 1 is a schematic illustration of an inventive subsystem with its elements in a building complex having four building parts A-D. The building part A ~~contains~~ includes a home base station 3 connected to a mobile radio network 1 via an external transmission/reception antenna 4. The mobile radio network may be, by way of example, a GSM network, UMTS network or other mobile radio network. In addition, the base station is connected by means of a wire line 22 to a landline network, e.g. to the ISDN network, PTSN network or another hardwired communication network 2. For internal communication, the home base station 3 has a transmission/reception antenna 5 which it can use to connect to the other mobile stations 17 and repeater stations 7 and 8 in the building part A.

Paragraph beginning on line 13 of page 9 has been amended as follows:

The repeater station 8 has a transmission/ reception antenna 12 and 13 situated in the building part A and in the building part B, ~~respectively~~. The building part B also ~~contains~~ includes a transmission/reception antenna 14 for the repeater station 9 from the building part D. The repeater station 9 also has a transmission/reception antenna 15 for the building part D.

Paragraph beginning on line 36 of page 9 has been amended as follows:

In addition, each of the building parts can ~~contain~~ include one or more mobile station(s) represented symbolically and provided with the reference numerals 17-20. The radio connections between the individual elements of the subsystem are symbolized by the arrows 23-29.

Paragraph beginning on line 28 of page 11 has been amended as follows:

Another variation of the subsystem according to the invention is shown in Figure figure 2. The fundamental difference with respect to Figure figure 1 is that the repeater station 8 is not in the building part A, but rather is installed in the building part B. In addition, the building part D has no repeater stations.

In the Claims:

1. (Amended) An in-house subsystem in at least one of a mobile radio network [(1) and/or in] and a wired communication network, [(2)] comprising:

a fixed home base station [(3)];

at least one repeater station [(6; 7; 8; 9)]; [and]

at least one mobile station [(17; 18; 19; 20,); and

at least one transmission/reception antenna for connection either to the at least one mobile station or to the at least one repeater station,

the fixed home base station [(3)] having at least one connection means [(4; 22)] to an external telecommunication network [(1; 2)] and at least one transmission/reception antenna [(5)] for internal connection to the at least one repeater station [(6; 7; 8; 9)],

the at least one repeater station [(6; 7; 8; 9)] having at least one connection element [(10; 11; 12; 13; 14; 15; 16)] for connection either to one of the home base station [(3)] or to another repeater station [(6; 7; 8; 9)],

[and at least one transmission/reception antenna (10; 11; 12; 13; 14; 15) for connection either to the at least one mobile station (17; 18; 19; 20) or to another repeater station (6; 7; 8; 9)], and

the at least one mobile station [(17; 18; 19; 20)] having one of the [a] transmission/reception antennas for communication with at least one of the mobile radio network [(1) and/or] or with a repeater station [(6; 7; 8; 9)], [characterized in that all] wherein the

elements [(3; 6; 7; 8; 9)] of the subsystem have means which automatically organize the splitting of [the] system resources between the fixed home base station, the at least one repeater station [(6; 7; 8; 9)] and the at least one mobile station [(17; 18; 19; 20)].

2. (Amended) The subsystem as claimed in claim 1, [characterized in that] wherein the means for automatic organization at least comprise an algorithm for automatically splitting the system resources between intermediate connections present in [lacuna] the fixed home base station[s (3)], the at least one repeater stations [(6; 7; 8; 9)] and the at least one mobile station [(17; 18; 19; 20)], each element of the subsystem [(3; 6; 7; 8; 9)] automatically using the system resources on the basis of the same algorithm.

3. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that] the connection means in the fixed home base station [are/] is a transmission/reception unit for wireless communication with at least one of the [a] mobile radio network [(1) and/or are/is a] or the wired connection [(22)] to a landline telecommunication network [(2)].

4. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that the at least] one connection element in the repeater station [(6; 7; 8; 9)] is [a] at least one of the transmission/reception antenna [(4) and/or] a cable connection [(16)].

5. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that], in the case of at least one line of connection, the communication from the fixed home base station to [a] the mobile station is routed via at least one repeater station [(6; 7; 8; 9) or via a plurality of repeater stations (6; 7; 8; 9) communicating with one another].

6. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that] the system resources split among one another include [contain] at least different frequencies.

7. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that] the system resources split among one another [contain] include at least different timeslots.

8. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that] the system resources split among one another [contain] include at least different [CDMA codes (CDMA = Code Division Multiple Access)] Code Division Multiple Access codes.

9. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that] each mobile station [(17; 18; 19; 20)], each repeater station [(6; 7; 8; 9)] and the fixed home base station [(3)] have a respective [PIN (PIN = Personal Identification Number),] personal identification number and the repeater stations [(6; 7; 8; 9)] and/or the fixed home base station [(3)] has a means for distinguishing between mobile stations with access authorization and mobile stations without access authorization.

10. (Amended) The subsystem as claimed in claim 9, [characterized in that] wherein the means for distinguishing between mobile stations with access authorization and mobile stations without access authorization has a data memory which [contains] includes the [PIN] personal identification number of mobile stations with access authorization.

11. (Amended) The subsystem as claimed in [one of the preceding claims, characterized in that] claim 1, wherein the subsystem is connected to the mobile radio network [(1)] on the

basis of [the] a Frequency Division Duplex method [FDD method (FDD = Frequency Division Duplex),] and the connection in the subsystem is based on [the TDD method (TDD = Time Division Duplex)] a Time Frequency Division Duplex method.

12. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that], in the case of one repeater station [(6; 7; 8; 9)], said repeater station has means for implementing transfer and/or acceptance of the mobile station [(17; 18; 19; 20)] to/by the fixed home base station [(3)].

13. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that,] in the case of at least two repeater stations [(6; 7; 8; 9)], said repeater stations have means for implementing connection transfer for the mobile station [(17; 18; 19; 20)] among the repeater stations [(6; 7; 8; 9)].

14. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that the] at least one repeater station [(6; 7; 8; 9)] has means for implementing connection transfer and connection acceptance for the mobile station [(17; 18; 19; 20)] between the mobile radio network [(1)] and the repeater stations [(6; 7; 8; 9)].

15. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that] the subsystem is associated with [the] a Global System for Mobile Communications network [GSM network (GSM = Global System for Mobile Communications)].

16. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that] the subsystem is associated with [the] a Universal Mobile Telecommunications System network [UMTS network (UMTS = Universal Mobile Telecommunication System)].

17. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that] the subsystem's landline network connection is associated with [the] a Integrated Services Digital Subscriber Line network [ISDN network (ISDN = Integrated Services Digital Network)].

18. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that] the subsystem's landline network connection is associated with [the] a [PSTN network (PSTN =)] Public Switched Telephone Network[]].

19. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that] the subsystem's landline network connection is associated with [the] a power supply network/powerline network.

20. (Amended) The subsystem as claimed in claim 1, wherein [one of the preceding claims, characterized in that] the subsystem's landline network connection is associated with [the] a [xDSL/ADSL network (xDSL = general generic term for Digital Subscriber Line, ADSL = Asymmetric Digital Subscriber Line)] Digital Subscriber Line/Asymmetric Digital Subscriber Line network.

21. (Amended) A method for communication in a subsystem of at least one of a mobile network [(1) and/or] and [of] a wired communication network, [where, in] the subsystem[, which comprises a plurality of elements containing] comprising; a home base station[,]; at least one repeater station; [(6; 7; 8; 9)] and at least one mobile station [(17; 18; 19; 20)],

where the home base station [(3)] maintains a connection to at least one of a mobile radio network [(1)] and [possibly to] a landline network, [(2)] and forwards [this] the connection to the at least one mobile station [(17; 18; 19; 20)] using the at least one repeater station [(6; 7; 8; 9)],

[characterized in that the at least] wherein one repeater station [(6; 7; 8; 9)] automatically splits the resources.

22. (Amended) The method as claimed in claim 21, [characterized in that] wherein the resource splitting includes splitting used frequencies and/or used timeslot and/or [CDMA code CDMA =]Code Division Multiple Access[)] code.

23. (Amended) The method as claimed in claim 21, wherein [one of the preceding method claims, characterized in that only that element () the mobile station or home base station[)] which initiates the logical connection setup starts the automatic use of the resources [(setup/clear-down of the data channels)] between itself and the next connection element in the logical connection chain, and, if there are one or more repeater stations [(6; 7; 8; 9)] in the logical line of connection, the respective repeater station [(6; 7; 8; 9)] performs channel setup for the next element, including automatic resource use.

24. (Amended) The method as claimed in claim 21, [one of the preceding method claims, characterized in that] wherein a repeater station [(6; 7; 8; 9)] serves a plurality of mobile stations [(17; 18; 19; 20)] at the same time.

25. (Amended) The method as claimed in claim 21, wherein [one of the preceding method claims, characterized in that] the repeater station [(6; 7; 8; 9)] transmits on a [BCCH (Broadcast Control Channel)] Broadcast Control Channel a list of resources already used which cannot be used by the mobile station initiating a connection.

26. (Amended) The method as claimed in claim 21, wherein [one of the preceding method claims, characterized in that it is carried out for] the connection setup is initiated from the landline network and/or mobile radio network [(1) (incoming call)] incoming call.

27. (Amended) The method as claimed in claim 21, wherein [one of the preceding method claims, characterized in that] it is carried out for] the connection setup is initiated by the subsystem [()outgoing call[]].

28. (Amended) The method as claimed in claim 21, wherein [one of the preceding method claims, characterized in that it is carried out within] the subsystem performs the [for] connection transfer procedures between various repeater stations [(6; 7; 8; 9)] and/or between a repeater station [(6; 7; 8; 9)] and the home base station [(3)].

In the Abstract:

Please replace the Abstract in its entirety with the Abstract attached hereto.

--IN-HOUSE SUBSYSTEM IN A MOBILE RADIO NETWORK

ABSTRACT

A an in-house subsystem in a mobile radio network having a fixed home base station, one repeater station and one mobile station, and a method for communication in this subsystem, where the elements of the subsystem have means which automatically organize the splitting of the system resources between the home base station, the at least one repeater station and the at least one mobile station.--

09/806034

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Description

JC08 Rec'd PCT/PTO 26 MAR 2001

In-house subsystem in a mobile radio network

5 The invention relates to an in-house subsystem in a mobile radio network comprising a fixed home base station, at least one repeater station (repeater) and at least one mobile station. The invention also relates to a method for communication in a subsystem of a
10 mobile radio network and/or of a wired communication network.

A similar subsystem and a similar method are known from international patent application WO 94/19877. This application shows a subsystem in a mobile radio network which has a fixed base station, a repeater station and a plurality of mobile stations, the fixed base station being connected to an external telecommunication network and being connected to a mobile station by means of a transmission/reception
20 antenna. Accordingly, this document also discloses a method for communication in a subsystem of a mobile radio network or of a wired communication network, where, in the subsystem, comprising a plurality of elements, the base station maintains a connection to a
25 mobile radio network and possibly to a landline network and forwards this connection to the at least one mobile station.

The problem arising with this known subsystem is that a single base station is not able to cover a
30 relatively large building, possibly with a number of stories, or else a building complex containing a number of individual buildings and open areas such that all locations are able to set up a good connection between mobile station and base station.

Reference is also made to the applicant's patent application DE 198 20 760 A1, published after the priority date, which solves the problem of adequate coverage. This document shows a broadband communication system having a plurality of wireless communication appliances connected to the telephone network via repeater stations, where the repeater stations are connected to the power supply network and communicate with one another via the latter.

However, a disadvantage of such a system is that each repeater station needs to be connected to a common power supply network in order to be able to communicate with one another. Particularly in the context of relatively large building complexes, problems may arise in this case, because the connection paths via existing power lines can turn out to be very long. This situation is additionally made much worse if the power connections for the individual buildings exist only through transformer stations of the public power supply companies. If the circuits for the different buildings or for the one building are not connected to the same phase, of usually three possible phases, problems additionally arise for communication transmission.

WO 94/03993 discloses an in-house branch exchange in which a multiplicity of wireless base stations are connected, this "wireless" in-house branch exchange using a frequency scanner to carry out for identification and selection of frequencies.

It is therefore an object of the invention to describe an in-house subsystem in a mobile radio network and/or in a wired communication network and a method for communication in a subsystem of a mobile radio network and/or of a wired communication network which provides satisfactory transmission/reception coverage for the mobile stations even in relatively

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large buildings and building complexes, including in the associated open-air installations.

This object is achieved both by the features of claim 1 and by the features of the first method claim.

Accordingly, the inventors propose an in-house subsystem in a mobile radio network and/or in a wired communication network which comprises a fixed home base station, at least one repeater station (repeater) and 5 at least one mobile station, the fixed home base station having at least one connection means to an external telecommunication network and at least one transmission/reception antenna for internal connection to the at least one repeater station, the at least one repeater station having at least one connection element 10 for connection either to the home base station or to another repeater station, and at least one transmission/reception antenna for connection either to the at least one mobile station or to another repeater 15 station, and the at least one mobile station having a transmission/reception antenna for communication with the mobile radio network or with a repeater station, all the elements of the subsystem having means which automatically organize the splitting of the system 20 resources between the home base station, the at least one repeater station and the at least one mobile station. The way in which automatic organization works is explained in more detail further below.

It should be pointed out that, in this 25 document, the term "in-house" in the context of the subsystem is used in the sense of the term "residential", as used generally in specialist circles, and is used to distinguish from "public" systems.

One particular refinement of the subsystem 30 according to the invention proposes that the means for automatic organization at least comprise an algorithm for automatically splitting the system resources between intermediate connections present [lacuna] the home base stations, the at least one repeater stations 35 and the at least one mobile station, each element of the subsystem automatically using the system resources on the basis of the same algorithm.

In another advantageous refinement, the connection means in the home base station are/is a transmission/reception unit for wireless communication with a mobile radio network and/or are/is a wired 5 connection to a landline telecommunication network.

In accordance with another advantageous refinement of the subsystem, in the case of at least one line of connection, the communication from the home base station to a mobile station is routed via at least 10 one repeater station or via a plurality of repeater stations communicating with one another.

By way of example, different frequencies and/or different timeslots and/or different CDMA codes (CDMA = Code Division Multiple Access) can be regarded 15 as being system resources which need to be split among one another.

Another requirement within the scope of the invention is that each mobile station, each repeater station and the home base station have a respective PIN 20 (PIN = Personal Identification Number), and the repeater stations and/or the home base station have a means for distinguishing between mobile stations with access authorization and mobile stations without access authorization. Advantageously, the means for 25 distinguishing between mobile stations with access authorization and mobile stations without access authorization can also have a data memory which contains the PIN of mobile stations with access authorization.

30 For connecting the subsystem to the mobile radio network and to the mobile station or mobile stations, advantageously, the FDD method (FDD = Frequency Division Duplex) can be used for the mobile radio network, and the TDD method (TDD = Time 35 Division Duplex) can be used within the subsystem.

Another advantageous refinement of the subsystem according to the invention is that the at

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least one repeater station has means for implementing transfer and/or

acceptance of the mobile station (handover) to/by the home base station and/or to/by another repeater station. This allows a mobile station to move freely within the coverage area of the subsystem while the 5 connection of the mobile station is routed via different connection paths and repeater stations, according to location, or is changed over between different repeater stations and connection paths.

Another, more extensive refinement of the 10 subsystem is that the at least one repeater station have means for implementing connection transfer and connection acceptance for the mobile station (handover) between the mobile radio network and the repeater stations. This achieves further improved mobility for 15 the mobile stations, since unproblematical transfer between an internal connection in the subsystem to the external connection in the mobile radio network is now also possible, without the user's communication being disrupted by this process.

20 The subsystem described above can, by way of example, be associated with the GSM network (GSM = Global System for Mobile Communications) and/or with the UMTS network (UMTS = Universal Mobile Telecommunication System). Similarly, the subsystem's 25 landline network connection can be associated with the ISDN network (ISDN = Integrated Services Digital Network), with the PSTN network (PSTN = Public Switched Telephone Network), with the power supply network/powerline network and/or with the xDSL/ADSL 30 network (xDSL = general generic term for Digital Subscriber Line, ADSL = Asymmetric Digital Subscriber Line).

The invention also achieves the object which is 35 set above by means of a method for communication in a subsystem of a mobile radio network and/or of a wired communication network, where, in the subsystem, which comprises a plurality of elements containing a home

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base station, at least one repeater station and at least one mobile station,

the home base station maintains a connection to a mobile radio network and possibly to a landline network and forwards this connection to the at least one mobile station using the at least one repeater station, and
5 the at least one repeater station automatically splits the resources. This automatic splitting of resources represents automatic organization of the system, the operation of which will be explained in more detail at a later point.

10 The resource splitting which is possible includes at least splitting the used frequencies and/or the used timeslot and/or the CDMA code (CDMA = Code Division Multiple Access).

Advantageously, with the designated method,
15 only that element (mobile station or base station) which initiates the logical connection setup starts the automatic use of the resources (setup/clear-down of the data channels) between itself and the next connection element in the logical connection chain. If there are
20 one or more repeater stations in the logical line of connection, the respective repeater station performs channel setup for the next element, including automatic resource use.

Another refinement of the method proposes that
25 a repeater station serve a plurality of mobile stations at the same time. This may be done, for example, by virtue of the repeater station(s) operating at a plurality of frequencies at the same time, or each mobile station being assigned one or more timeslots in
30 successive time frames.

One advantageous option for splitting the available system resources can involve the repeater station transmitting on a particular, predefined resource (frequency, code, timeslot), e.g. on a BCCH
35 (Broadcast Control

Channel), or in a particular free timeslot a list of resources already used. In this way, a mobile station potentially initiating a connection knows which resources cannot currently be used.

5 The method designated above can advantageously be carried out, by way of example, for connection setup initiated from the landline network and/or mobile radio network (incoming call) and/or for connection setup initiated by the subsystem (outgoing call).

10 With similar advantage, the invention also provides the opportunity to use the method described in more detail above within the subsystem for hand over procedures between the various repeater stations and/or between a repeater station and the base station.

15 The aforementioned concept of automatic organization in terms of resource splitting denotes a search algorithm which is respectively implemented by base station, repeater station and/or mobile station and assesses the respectively free system 20 resources - which usually comprise frequency, code and timeslot indices - using a quality criterion (e.g. RSSI = Radio Signal Strength Indication = measurement of reception field strength, checking of CRC bits), to determine the extent to which the resources are 25 disrupted or used, and uses a cyclically refreshed look-up table (for frequency, code and timeslot index) to decide which resource is used for data transmission.

An illustrative algorithm may look as follows:

1. Cyclic measurement of reception quality (using 30 RSSI or CRC = Cyclic Redundancy Check) and storage in an electronic table (look-up table).
2. Search for the "best" free transmission resource in the look-up table.

3. Decision on use of a particular resource.

If a data packet is now received with errors, an appropriate ARQ method (ARC = Automatic Repeat on Request) can transmit the data packet again.

5 Another improvement and optimization, which comes to bear particularly with a large volume of traffic, can involve the repeater station using the BCCH to inform the mobile stations of which resources are already used or which resources cannot be used.
10 This prevents faults (e.g. the simultaneous attempt by two mobile stations to access the same resource).

Other refinements, additional features and advantages of the invention can be found in the description below of preferred illustrative embodiments
15 with reference to the drawings, and in the dependent claims.

It goes without saying that the features of the invention which are mentioned above and are yet to be explained below can be used not only in the particular
20 combination indicated, but also in other combinations or on their own, without departing from the scope of the invention.

The invention will be explained in more detail below with the aid of the drawing.

25 Figure 1: inventive subsystem for a building complex,

Figure 2: further variant of a subsystem with a different repeater split.

30 Figure 1 is a schematic illustration of an inventive subsystem with its elements in a building complex having four building parts A-D. The building part A contains a home base

station 3 connected to a mobile radio network 1 via an external transmission/reception antenna 4. The mobile radio network may be, by way of example, a GSM network, UMTS network or other mobile radio network. In 5 addition, the base station is connected by means of a wire line 22 to a landline network, e.g. to the ISDN network, PTSN network or another hardwired communication network 2. For internal communication, the home base station 3 has a transmission/reception 10 antenna 5 which it can use to connect to the other mobile stations 17 and repeater stations 7 and 8 in the building part A.

The repeater station 8 has a transmission/reception antenna 12 and 13 situated in the building part A and in the building part B, respectively. The building part B also contains a transmission/reception antenna 14 for the repeater station 9 from the building part D. The repeater station 9 also has a transmission/reception antenna 15 for the building part 20 D.

The repeater station 6 from the building part A has a fixed connecting line 16 connecting it to the repeater station 7 from the building part C. The repeater station 7 also has a transmission/reception 25 antenna 11 to cover the building part C. The connection 22 between the repeater station 6 and repeater station 7 may also be an optical communication connection by means of LASER or infrared, or else a microwave connection. The connection may likewise be routed via a 30 wireless or wired in-house bus system (e.g. EIB = European Installation Bus, EHS = European Home Systems, Batibus from Batibus Club International) or via radio relay, wireless LAN (Local Area Network), twisted pair, four-wire connection, coaxial cable, 35 glass fiber cable, etc.

In addition, each of the building parts can contain one or more mobile station(s) represented

symbolically and provided with the reference numerals 17-20. The radio

connections between the individual elements of the subsystem are symbolized by the arrows 23-29.

All the stationary elements of the subsystem, namely the repeater stations 6-9, including the home 5 base station 3, "know" of one another as a result of their being characterized by a personal identification number (PIN). Similarly, the stationary elements use the respective PIN, which is specific for each mobile station, to recognize whether the mobile station is 10 authorized to access the communication network of the subsystem. If a mobile station with access authorization leaves the coverage area of a repeater station and roams into the coverage area of another repeater station, then a transfer procedure (hand over) 15 from the first to the second repeater station is initiated. By way of example, the mobile station 19 can move from the building part B to the building part D, that is to say can leave the coverage area of the repeater station 8 and enter the coverage area of the 20 repeater station 9. The move from the building part B to the building part D then initiates the transfer procedure, and the connection between mobile radio network 1 or landline network 2 to the mobile station 19 is first handled via the home base station 3 to the 25 repeater station 8 and then via home base station 3 via repeater station 8 and repeater station 9. In the case of this transfer procedure, the distribution of the system resources is regulated locally and automatically, just like when a new connection is set 30 up. The provision of such automatic organization is described above.

A corresponding process takes place, for example, when the mobile station 17 moves from the building part A to the building part C. In this case, 35 the home base station 3 recognizes that the mobile station 17 is leaving its coverage area, while the repeater station 7 recognizes that the mobile station is now entering its coverage area and prompts a

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transfer procedure from the home base station 3 to the repeater station 6 and repeater station 7.

If, by way of example, the mobile station 18 moves from the building part C into the building part D, then the repeater station 7 recognizes that its area is being left, and the repeater station 9 registers the 5 entry of the mobile station 18 into its coverage area. The transfer procedure is thus used to transfer the connection for the mobile station 18, which was initially routed via the repeater stations 7 and 6 to the home base station 3, to the repeater station 9, 10 which routes its connection to the home base station 3 via the repeater station 8.

This allows unrestricted mobility of the mobile stations within the building complex with its building parts A-B, with each location providing optimum 15 connection to the mobile network 1 and/or landline network 2. The mobile stations are also able to roam during an existing connection without interruption.

In the case of a relatively large building, repeater stations can thus be set up on the individual 20 stories. With relatively large building complexes having a number of buildings and open terrain, one or more repeater stations can be installed for each building, for example, and one repeater station can be used for the open terrain, the home base station being 25 able to reach all repeater stations via one or more repeater stations, and the available system resources being split automatically.

Another variation of the subsystem according to the invention is shown in figure 2. The fundamental 30 difference with respect to figure 1 is that the repeater station 8 is not in the building part A, but rather is installed in the building part B. In addition, the building part D has no repeater stations.

Such a situation is conceivable when the 35 physical separation between the building parts A and B, on the one hand, and

the building parts B and D, on the other hand, is small enough, in construction terms, or is close enough, in physical terms, for the radio link 23 between the home base station 3 or possibly another radio link from 5 another repeater station to be sufficient to reach the repeater station 8. Similarly, there is no need for a repeater station to be present in a building part, as in the part D in this case, if this building part is also covered by a repeater station positioned 10 elsewhere.

The fundamentally important aspect when splitting the intermediate stations is thus that there is adequate radio coverage for the rooms, and a direct or indirect connection can be set up between the mobile 15 terminals and the home base station from each location as far as possible. In this context, it does not matter how many repeater stations are needed for the connection.

REF ID: A65265

Patent claims

1. An in-house subsystem in a mobile radio network (1) and/or in a wired communication network (2) comprising a fixed home base station (3), at least one repeater station (6; 7; 8; 9) and at least one mobile station (17; 18; 19; 20), the fixed home base station (3) having at least one connection means (4; 22) to an external telecommunication network (1; 2) and at least one transmission/reception antenna (5) for internal connection to the at least one repeater station (6; 7; 8; 9), the at least one repeater station (6; 7; 8; 9) having at least one connection element (10; 11; 12; 13; 14; 15; 16) for connection either to the home base station (3) or to another repeater station (6; 7; 8; 9), and at least one transmission/reception antenna (10; 11; 12; 13; 14; 15) for connection either to the at least one mobile station (17; 18; 19; 20) or to another repeater station (6; 7; 8; 9), and the at least one mobile station (17; 18; 19; 20) having a transmission/reception antenna for communication with the mobile radio network (1) and/or with a repeater station (6; 7; 8; 9), characterized in that all the elements (3; 6; 7; 8; 9) of the subsystem have means which automatically organize the splitting of the system resources between the home base station, the at least one repeater station (6; 7; 8; 9) and the at least one mobile station (17; 18; 19; 20).

2. The subsystem as claimed in claim 1, characterized in that the means for automatic organization at least comprise an algorithm for automatically splitting the system resources between intermediate connections present [lacuna] the home base stations (3), the at least one repeater stations (6; 7; 8; 9) and the at least one mobile station (17; 18; 19; 20), each element of the subsystem (3; 6; 7; 8; 9)

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automatically using the system resources on the basis
of the same algorithm.

3. The subsystem as claimed in one of the preceding claims, characterized in that the connection means in the home base station are/is a transmission/reception unit for wireless communication with a mobile radio network (1) and/or are/is a wired connection (22) to a landline telecommunication network (2).

4. The subsystem as claimed in one of the preceding claims, characterized in that the at least one connection element in the repeater station (6; 7; 8; 9) is a transmission/reception antenna (4) and/or a cable connection (16).

5. The subsystem as claimed in one of the preceding claims, characterized in that, in the case of at least one line of connection, the communication from the home base station to a mobile station is routed via at least one repeater station (6; 7; 8; 9) or via a plurality of repeater stations (6; 7; 8; 9) communicating with one another.

6. The subsystem as claimed in one of the preceding claims, characterized in that the system resources split among one another contain at least different frequencies.

7. The subsystem as claimed in one of the preceding claims, characterized in that the system resources split among one another contain at least different timeslots.

8. The subsystem as claimed in one of the preceding claims, characterized in that the system resources split among one another contain at least different Code Division Multiple Access "CDMA" codes.

9. The subsystem as claimed in one of the preceding claims, characterized in that each mobile station (17; 18; 19; 20), each repeater station (6; 7; 8; 9) and the home

base station (3) have a respective personal identification number "PIN", and the repeater stations (6; 7; 8; 9) and/or the home base station (3) has a means for distinguishing between mobile stations with access authorization and mobile stations without access authorization.

10. The subsystem as claimed in claim 9, characterized in that the means for distinguishing between mobile stations with access authorization and mobile stations without access authorization has a data memory which contains the PIN of mobile stations with access authorization.

11. The subsystem as claimed in one of the preceding claims, characterized in that the subsystem is connected to the mobile radio network (1) on the basis of the Frequency Division Duplex "FDD" method and the connection in the subsystem is based on the Frequency Division Duplex "TDD" method.

12. The subsystem as claimed in one of the preceding claims, characterized in that, in the case of one repeater station (6; 7; 8; 9), said repeater station has means for implementing transfer and/or acceptance of the mobile station (17; 18; 19; 20) to/by the home base station (3).

13. The subsystem as claimed in one of the preceding claims, characterized in that, in the case of at least two repeater stations (6; 7; 8; 9), said repeater stations have means for implementing connection transfer for the mobile station (17; 18; 19; 20) among the repeater stations (6; 7; 8; 9).

14. The subsystem as claimed in one of the preceding claims, characterized in that the at least one repeater station (6; 7; 8; 9) has means for implementing connection transfer and connection acceptance for the mobile station (17; 18; 19; 20) between the mobile radio network (1) and the repeater stations (6; 7; 8; 9).

15. The subsystem as claimed in one of the preceding claims, characterized in that the subsystem is associated with the Global System for Mobile Communications "GSM" network.

16. The subsystem as claimed in one of the preceding claims, characterized in that the subsystem is associated with the Universal Mobile Telecommunication System "UMTS" network.

17. The subsystem as claimed in one of the preceding claims, characterized in that the subsystem's landline network connection is associated with the Integrated Services Digital Network "ISDN" network.

18. The subsystem as claimed in one of the preceding claims, characterized in that the subsystem's landline network connection is associated with the PSTN network.

19. The subsystem as claimed in one of the preceding claims, characterized in that the subsystem's landline network connection is associated with the power supply network/powerline network.

20. The subsystem as claimed in one of the preceding claims, characterized in that the subsystem's landline network connection is associated with the Digital Subscriber Line/Asymmetric Digital Subscriber Line "xDSL/ADSL" network.

21. A method for communication in a subsystem of a mobile network (1) and/or of a wired communication network, where, in the subsystem, which comprises a plurality of elements containing a home base station, at least one repeater station (6; 7; 8; 9) and at least one mobile station (17; 18; 19; 20), where the home base station (3) maintains

a connection to a mobile radio network (1) and possibly to a landline network (2) and forwards this connection to the at least one mobile station (17; 18; 19; 20) using the at least one repeater station (6; 7; 8; 9), characterized in that the at least one repeater station (6; 7; 8; 9) automatically splits the resources.

22. The method as claimed in claim 21, characterized in that the resource splitting includes splitting used frequencies and/or used timeslot and/or CDMA code.

23. The method as claimed in one of the preceding method claims, characterized in that only that element, in particular mobile station or base station, which initiates the logical connection setup starts the automatic use of the resources, in particular setup/clear-down of the data channels, between itself and the next connection element in the logical connection chain, and, if there are one or more repeater stations (6; 7; 8; 9) in the logical line of connection, the respective repeater station (6; 7; 8; 9) performs channel setup for the next element, including automatic resource use.

24. The method as claimed in one of the preceding method claims, characterized in that a repeater station (6; 7; 8; 9) serves a plurality of mobile stations (17; 18; 19; 20) at the same time.

25. The method as claimed in one of the preceding method claims, characterized in that the repeater station (6; 7; 8; 9) transmits on a Broadcast Control Channel "BCCH" a list of resources already used which cannot be used by the mobile station initiating a connection.

26. The method as claimed in one of the preceding method claims, characterized in that it is carried out for connection setup initiated from the landline network and/or mobile radio network (1) "incoming call".

27. The method as claimed in one of the preceding method claims, characterized in that it is carried out for connection setup initiated by the subsystem "outgoing call".

28. The method as claimed in one of the preceding method claims, characterized in that it is carried out within the subsystem for connection transfer procedures between various repeater stations (6; 7; 8; 9) and/or between a repeater station (6; 7; 8; 9) and the base station (3).

Abstract

In-house subsystem in a mobile radio network

The invention relates to an in-house subsystem in a mobile radio network (1) having a fixed home base station (3), at least one repeater station (6; 7; 8; 9) and at least one mobile station (17; 18; 19; 20), and to a method for communication in this subsystem, where all the elements (3; 6; 7; 8; 9) of the subsystem have means which automatically organize the splitting of the system resources between the home base station, the at least one repeater station (6; 7; 8; 9) and the at least one mobile station (17; 18; 19; 20).

Figure 1

Fig. 1

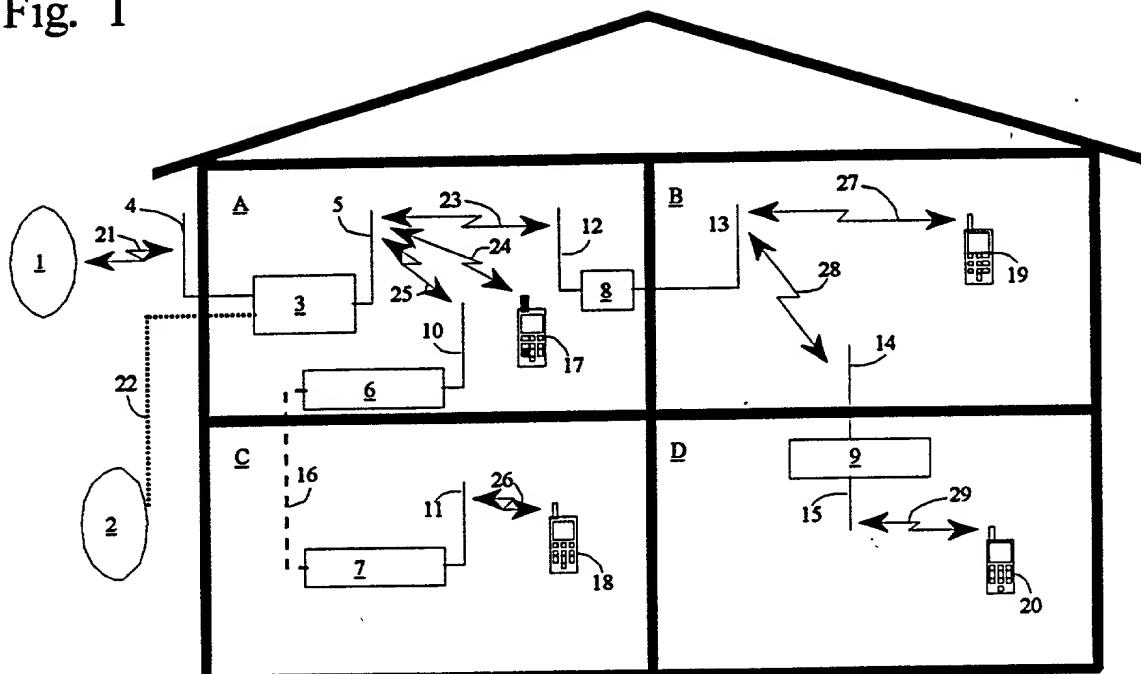
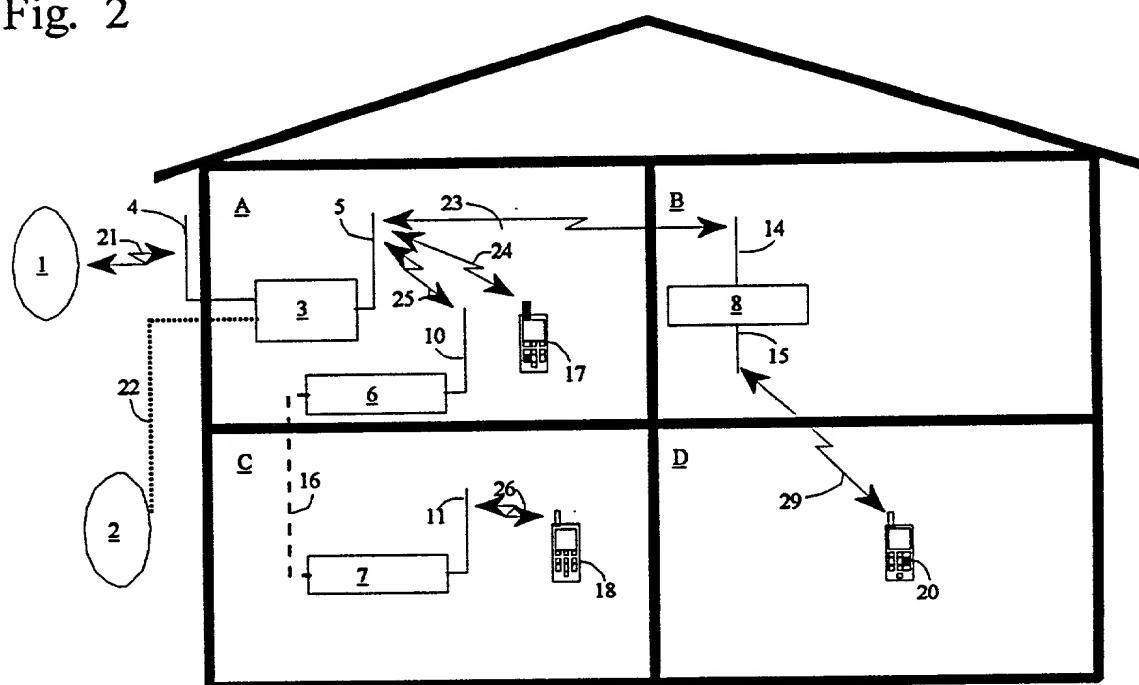


Fig. 2



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de nachstehend gekennzeichnet, die ein Anmelde-
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Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are
as stated below next to my name,

I believe I am the original, first and sole inventor (if
only one name is listed below) or an original, first and
joint inventor (if plural names are listed below) of the
subject matter which is claimed and for which a patent
is sought on the invention entitled

the specification of which

(check one)

is attached hereto.

was filed on _____ as

PCT international application

PCT Application No. _____

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the
contents of the above identified specification, including
the claims as amended by any amendment referred to
above.

I acknowledge the duty to disclose information which
is material to the examination of this application in
accordance with Title 37, Code of Federal
Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35,
United States Code, §119 of any foreign application(s)
for patent or inventor's certificate listed below and
have also identified below any foreign application for
patent or inventor's certificate having a filing date
before that of the application on which priority is
claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

198 44 099.5 Germany
(Number) (Country)
(Nummer) (Land)

25. September 1998

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

Yes No
 Ja Nein

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

Yes
 Ja

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

Yes
 Ja

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhangig,
aufgegeben)

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgeben)

(Status)
(patented, pending,
abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozeßordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: (Name und Registrationsnummer anführen)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

And I hereby appoint
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